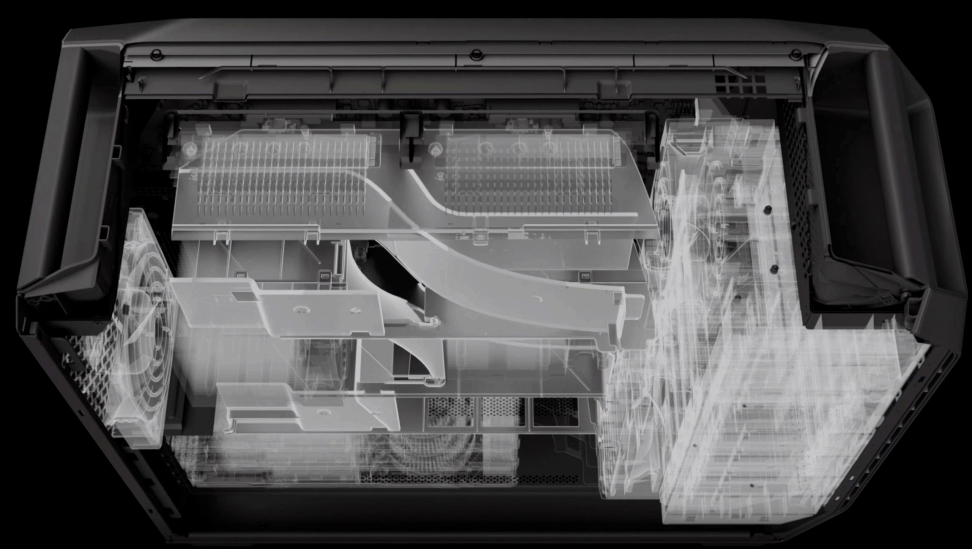
What Kind of Computer Does Data Science Demand?



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Today's data scientists need more than ordinary office computers. Almost everything they do is big: big data, enormous model repositories, a large assortment of tools, insane levels of automation. And while the cloud helps at a certain point in the process, data scientists first need a more agile, native computing solution wherever they're working— a high-performance data science workstation.

The interactive checklist below shows what you should look for in a data science workstation, including:

- Preloaded software
- RAM, GPU, and CPU needs
- Heightened security
- Hybrid and remote capabilities
- Time-saving tools
- The right form factor for your needs

The right software stack, ready to go

Preloaded software

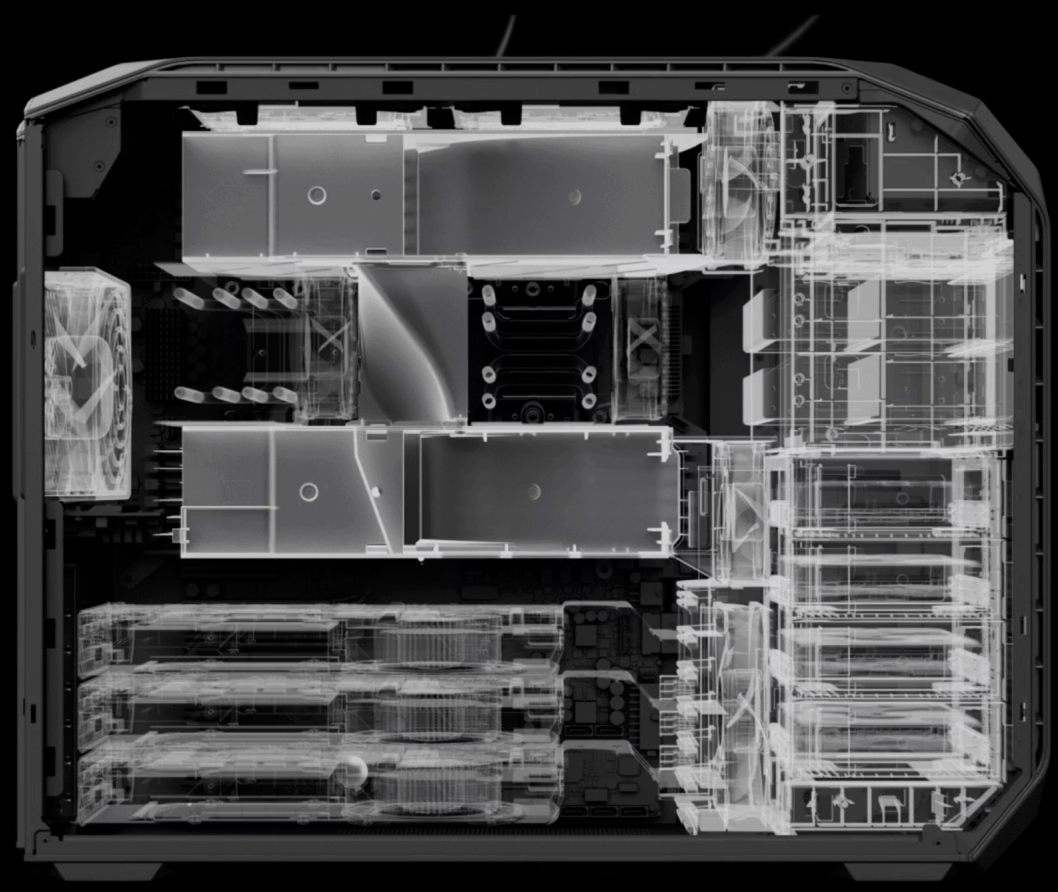
A true data science workstation comes with essential software preinstalled and ready to go. Plus, it should be equipped with Windows Subsystem for Linux 2 (WSL 2),[1] enabling data scientists to run both Windows and Linux, thereby eliminating the need for two separate computers or complicated work-arounds.

Operating systems:

Windows 11 ubuntu by Canonical and friends

Data science software:

PyTorch RAPIDS XGBoost Keras TensorFlow scikit learn



Scaled for data science

RAM, GPU, and CPU needs

How much RAM, GPU memory, and CPU power does a workstation need? A capable workstation can dramatically lighten dependence on the cloud, helping maintain data security and keep pay-as-you-go costs in check. The following spec recommendations come straight from data scientists via discussions and polls on Kaggle, Quora, and data-science-specific Reddit conversations.

16 GM+ of RAM

Choose 16 GB for current or future heavy workload usage
It's a must for heavy machine learning models that are inc

4 GB GPU memory at a minimum:

Powerful GPUs like NVIDIA RTX™ are vital for complex calculations like
deep learning models, and interactive data visualizations. Without a pr
your schedule.

Processors

Data scientists need more and more processing power, hardware compatibility, power efficiency, and thermal management in the processors.

Advanced processors

Intel® Core™ i7-i9 and Xeon®[2]

8+ cores

Four cores may suffice for basic data science, but go with eight cores a

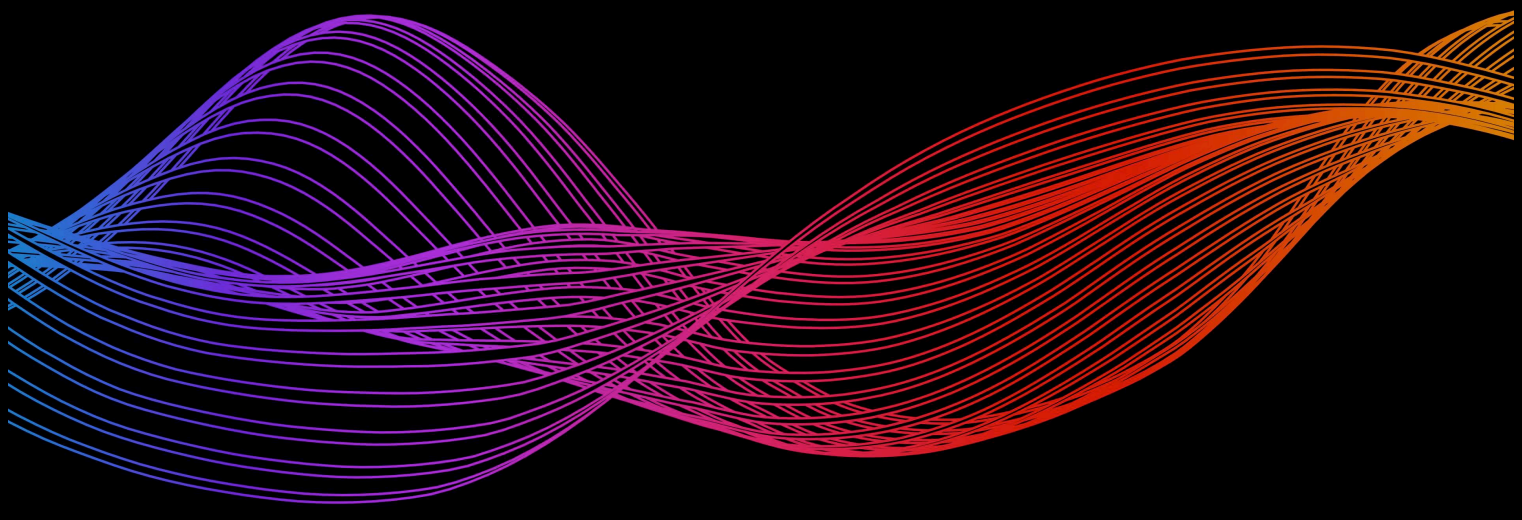
2.0 GHz base clock speed

This base frequency helps maintain high speeds and low lag.

Unintrusive always-on security

Heightened security

Security is a priority for everyone, but the sensitive nature of data heightens security concerns even more. Relative to cloud computing, data science workstations start with the security advantage of keeping data native. And the best data science workstations go even further with built-in layers of security, including self-healing firmware, in-memory breach detection, and threat containment via isolation to reduce the addressable attack surface. With the right workstation, this sort of added security takes minimal attention.[3]



Support a hybrid workforce

Support a hybrid workforce

Today, data scientists need to work from anywhere, migrate data to everywhere, collaborate with colleagues the world over, and accomplish all of it without any loss in speed or power. While data scientists can access the cloud from multiple locations, the cloud isn't always cost efficient for many tasks. And accessing the cloud out of the office on an unsecured connection can pose a significant security risk.

Hybrid workplaces call for more movable workloads.

With workstations, mobility can take two shapes. It can be a mobile data science workstation that looks like a laptop on the outside but carries tremendous GPU and CPU power within. Or it can be a secure, remote access system that enables data scientists to use virtually any device to access the power of their desktop or rack-mounted workstation from anywhere without losing speed or power. And as noted earlier, with preinstalled WSL 2,[1] data scientists can have this mobility without carrying around separate computers to use both Windows and Linux.

Where workstations save you

Time-saving tools

The right workstation can help data scientists save time in many areas such as:

- Downtime and issues with manual loading, updating, and patching software
- Lag times in data migrations
- The complexities generated by running workloads on multiple machines
- Constantly restarting projects when they crash under their own weight on a weaker computer
- Patching together systems and devices to finish a large (and typically increasing) data science workload
- A lack of options in balancing workloads between local and cloud resources to better manage overall costs

The right workstation fit

The right form factor for your needs

There are three main forms a workstation can come in: mobile (laptop), desktop, and rack mounted.

Mobile workstations are built for data science at real-life scale and are ready to hit the road without encountering any speed bumps. They offer GPU performance beyond that of typical gaming laptops that may have insufficient internal room for the required cooling system.

Desktop and rack-mounted workstations can bring massive data science capacity. You can get these workstations with as many as four powerful graphics cards like the NVIDIA RTX™, an ever-increasing number of CPUs, and, importantly, remote access systems that enable data scientists to securely draw upon their workstation's power from virtually anywhere, using almost any device—without loss of speed, capacity, or even resolution.

Equip your data scientists with the right tools.

HP Z, the high-performance computing brand from HP, has developed an entire line of mobile, desktop, and rack-mounted workstations specifically with data scientists in mind. HP Z data science workstations offer an optional preloaded data science software stack, plus Windows 11 Pro and Ubuntu, which can be run on the same machine thanks to preinstalled WSL 2.[1] HP Z workstations can be configured to your team's specific needs, are available with the flexibility of an Emmy® Award–winning,[4] secure remote access system, and are designed with renowned HP engineering focus to handle the intense demands of data science.

HP Z for Data Scientists & Analysts

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Disclaimers

1. WSL 2 requires Windows 10 or higher, Intel Core i5 processor or higher and is available on select Z workstations. You must be running Windows 10 version 21H2 and higher (Build 19044 and higher) or Windows 11.
2. Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering, branding, and/or naming is not a measurement of higher performance.
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